



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

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OCT - 7 1999

Environmental Cleanup Office


IN REPLY

REFER TO: OEA-095

October 6, 1999

MEMORANDUM

SUBJECT: Bunker Hill, CLP Metals Analysis, Data Validation
Case: 27252
SDG: MJAK65

FROM: 
Laura Castrilli, Chemist
Quality Assurance and Data Unit, OEA

TO: Mary Kay Voytilla, Regional Project Manager
Office of Environmental Cleanup

147886

USEPA SF



1125018

CC: Bruce Woods, Region 10 CLP TPO
Jim Stefanoff, CH2M Hill

The following is a validation of ICP-AES and mercury analyses of six total and six dissolved water samples from the Bunker Hill project. The analyses were performed following the USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis Multi-media, Multi-Concentration, ILM04.0. Analyses were conducted by Sentinel, Inc, of Huntsville, Alabama. This validation was conducted for the following samples:

MJAK65	MJAK67	MJAK69	MJAK71	MJAK73	MJAK75
MJAK66	MJAK68	MJAK70	MJAK72	MJAK74	MJAK76

Data Qualifications

The following comments refer to the Sentinel Laboratory's performance in meeting quality control specifications outlined in the CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILM04.0. The comments presented herein are based on the information provided for the review.

1.0 Timeliness - Acceptable

The technical (40 CFR part 136) holding time from the date of collection for mercury in water is 28 days. The holding time for the remaining metals in water is 180 days. The samples were collected on 7/27/99. Mercury analyses were completed on 08/21/99. ICP-AES analyses were completed on 08/26/99.

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2.0 Sample Preparation - Acceptable

The samples were prepared for mercury analyses on 08/20/99. The samples were prepared for ICP-AES analyses on 08/19/99. The samples were re-prepared for ICP-AES (iron only) analyses on 08/26/99. No qualification was made based on sample preparation.

3.0 Calibrations/Calibration Verifications - Acceptable

The samples were analyzed for mercury by CVAAS on 08/20/99. Initial calibration included one blank and six standards. The curve was linear with a correlation coefficient greater than 0.995.

The samples were analyzed by ICP-AES on 08/25/99 (main analyses except for iron) and 08/26/99 (main iron analyses and iron, manganese and/or zinc dilutions). The instrument was standardized according to the analytical method each day of analysis using one blank and a single calibration standard for each element.

All ICP-AES and CVAAS (mercury) calibrations were performed as required and met the acceptance criteria; therefore, no qualification was made on this basis.

Continuing calibration verifications (CCVs) are required before and after sample analysis and after every 10 samples during analysis. Mercury recoveries must be within 80-120%. Other metal recoveries must be within 90-110%. The frequency of analysis of CCVs was met. All ICP-AES and CVAAS (mercury) CCVs (initial and continuing) bracketing reported sample results met the recovery criteria; therefore no qualification was made on this basis.

4.0 Laboratory Control Samples - Acceptable

Laboratory Control samples are digested and analyzed along with the samples to verify the efficiency of laboratory procedures. All recoveries associated with reported sample results met the acceptance criteria; therefore no qualification was made on this basis.

5.0 Blanks -

Procedural blanks were prepared with the samples to show potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified if the analyte concentration was less than five times the analytical value in the blank.

No analytes were detected in the preparation blanks. Barium, calcium, chromium, iron, magnesium, manganese and zinc were detected in one or more continuing calibration blanks (CCBs). Aluminum in several CCBs had negative results with absolute values greater than the detection limit. Based on blank contamination, associated sample results were qualified as follows:

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- ◆ aluminum in samples MJAK70 and MJAK76 was qualified 'J' or 'UJ'.
- ◆ calcium in sample MJAK76 was qualified 'U'
- ◆ chromium in samples MJAK68, MJAK69, MJAK71, MJAK72, MJAK74, and MJAK76 was qualified 'U'

All other sample results were greater than five times the associated blank levels (or were already undetected) and were not qualified based on blank contamination.

6.0 ICP-AES Interference Check Sample -

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run and recoveries must be between 80% and 120%. All ICS recoveries associated with reported sample results were within the recovery criterion; with the exception of the copper recovery (77% average recovery, true value = 28 ug/L) in the ICS-A analyses 08/25/99. The ICS-AB recoveries for copper were all acceptable (true value = 507 ug/L). No copper results were qualified based on the ICS-A recovery as all the copper sample results were at levels closer to or greater than the ICS-AB copper level.

The raw data for a number of samples had interfering levels of iron and/or manganese. Analytes for which iron and/or manganese is an interferent were qualified as follows:

- ◆ Antimony in samples MJAK66, MJAK68, MJAK72, and MJAK74 was qualified 'UJ', estimated detection limit (possible false positives due to high iron). Antimony in two of the three ICS-A analyses bracketing these samples had results greater than the detection limit.
- ◆ Chromium in samples MJAK66, MJAK68, MJAK72, and MJAK74 was qualified 'UJ', estimated detection limit (possible false positives due to high manganese). Analyte equivalents in Table 2 of ILM04.0 were used to estimate the interference with chromium due to manganese at levels > 50 mg/L.
- ◆ Vanadium in samples MJAK66, MJAK68, MJAK72, and MJAK74 was qualified 'UJ', estimated detection limit (possible false negatives due to high iron). Vanadium in all three of the ICS-A analyses bracketing these samples had negative results with absolute values greater than the detection limit.

Some of the samples required one or more dilution runs to report iron, zinc, and/or manganese results within the instrumental linear range. The raw data for all analytes were compared using the available dilutions to see if 1) zinc and/or manganese levels in the undiluted samples were high enough that interelement corrections may not be sufficient for the analytes that were reported from the undiluted analysis or 2) a pattern of suppression or enhancement was evident.

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This review was limited to an assessment of just cadmium, iron, manganese, lead, and zinc results. No further qualification was made based on this assessment.

7.0 Duplicate Analysis - Acceptable

Duplicate analyses were done on sample MJAK65. Water duplicate results were within the $\pm 20\%$ Relative Percent Difference (RPD) or \pm CRDL criteria for water results < 5 times the CRDL criteria. No qualification was made based on duplicate results.

8.0 Field Duplicate Analysis - Not Applicable

Field duplicate analysis for samples in this SDG was not indicated in the field collection documentation.

9.0 Matrix Spike Analysis -

Matrix spike sample analyses are done to provide information about the effect of the sample matrix on digestion and measurement methods. Matrix spike recovery must be within the limits of 75 - 125%.

Matrix spike analyses were done on sample MJAK65. All matrix spike recoveries were within the required QC limits, with the exception of antimony (61%). All antimony results were qualified 'J', estimated (possible low bias for most results, unknown bias for samples that also had qualification due to suspected iron interference).

10.0 Graphite Furnace Atomic Absorption Spec (GFAAS) QC - Not Applicable -

GFAAS was not used for the analysis of these samples.

11.0 ICP-AES Serial Dilution - Acceptable

Sample MJAK65 was analyzed by ICP-AES serial dilution to check for potential interferences. All analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within the 10% criteria; therefore no qualification was made on this basis.

12.0 Detection Limits - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the 'U' qualifier is attached. Contract Required Detection Limit (CRDL) standards are required to demonstrate a linear calibration curve near the CRDL. CRDL standards were run at the required frequency.

13.0 Overall Assessment of the Data

This validation of the data is based on the criteria outlined in the *National Functional Guidelines for Inorganic Data Review* (02/94).

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Approximately 9.4% of the data was qualified based on blank contamination, interference and/or matrix spike recovery.

Below are the definitions for the National Functional Guidelines for Inorganic Data Review (02/94) qualifiers used when validating/qualifying data from Inorganic analysis.

DATA QUALIFIERS

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- J - The associated value is an estimated quantity.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK65

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23256S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	246			P
7440-36-0	Antimony	4.1	B	75	P
7440-38-2	Arsenic	65.3			P
7440-39-3	Barium	18.3	B		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	35.9			P
7440-70-2	Calcium	8220			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	16.1	B		P
7440-50-8	Copper	37.4			P
7439-89-6	Iron	31200			P
7439-92-1	Lead	784			P
7439-95-4	Magnesium	4960	B		P
7439-96-5	Manganese	6370			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	17.2	B		P
7440-09-7	Potassium	1500	B		P
7782-49-2	Selenium	2.6	B		P
7440-22-4	Silver	2.4	B		P
7440-23-5	Sodium	967	B		P
7440-28-0	Thallium	8.8	B		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	14900			P
	Cyanide				NR

10/26/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK66

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23257S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12400			P
7440-36-0	Antimony	10.7	B	N UJ	P
7440-38-2	Arsenic	685			P
7440-39-3	Barium	7.9	B		P
7440-41-7	Beryllium	6.8			P
7440-43-9	Cadmium	1100			P
7440-70-2	Calcium	36000			P
7440-47-3	Chromium	7.2	B	UJ	P
7440-48-4	Cobalt	152			P
7440-50-8	Copper	374			P
7439-89-6	Iron	779000			P
7439-92-1	Lead	859			P
7439-95-4	Magnesium	87200			P
7439-96-5	Manganese	102000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	155			P
7440-09-7	Potassium	769	B		P
7782-49-2	Selenium	71.9			P
7440-22-4	Silver	35.7			P
7440-23-5	Sodium	28300			P
7440-28-0	Thallium	178			P
7440-62-2	Vanadium	1.4	U	J	P
7440-66-6	Zinc	495000			P
	Cyanide				NR

JL 10/16/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK67

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23258S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	539			P
7440-36-0	Antimony	3.0	U	ND	P
7440-38-2	Arsenic	19.7			P
7440-39-3	Barium	23.6	B		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	25.3			P
7440-70-2	Calcium	7560			P
7440-47-3	Chromium	1.0	B		P
7440-48-4	Cobalt	5.3	B		P
7440-50-8	Copper	23.0	B		P
7439-89-6	Iron	8090			P
7439-92-1	Lead	195			P
7439-95-4	Magnesium	7200			P
7439-96-5	Manganese	4830			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	7.9	B		P
7440-09-7	Potassium	803	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.7	B		P
7440-23-5	Sodium	846	B		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	9420			P
	Cyanide				NR

SEP 10 1999

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK68

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23259S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	25000	-		P
7440-36-0	Antimony	22.3	B	NUJ	P
7440-38-2	Arsenic	1430			P
7440-39-3	Barium	7.6	B		P
7440-41-7	Beryllium	13.1			P
7440-43-9	Cadmium	2090			P
7440-70-2	Calcium	54400			P
7440-47-3	Chromium	12.0		UJ	P
7440-48-4	Cobalt	291			P
7440-50-8	Copper	768			P
7439-89-6	Iron	1610000			P
7439-92-1	Lead	963			P
7439-95-4	Magnesium	114000			P
7439-96-5	Manganese	197000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	290			P
7440-09-7	Potassium	689	B		P
7782-49-2	Selenium	144			P
7440-22-4	Silver	61.2			P
7440-23-5	Sodium	71000			P
7440-28-0	Thallium	364			P
7440-62-2	Vanadium	1.4	U	J	P
7440-66-6	Zinc	1200000			P
	Cyanide				NR

See 12/06/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK69

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23260S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	217			P
7440-36-0	Antimony	3.0	U	N J	P
7440-38-2	Arsenic	54.1			P
7440-39-3	Barium	17.3	B		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	31.3			P
7440-70-2	Calcium	8120			P
7440-47-3	Chromium	1.5	B	U	P
7440-48-4	Cobalt	15.5	B		P
7440-50-8	Copper	31.5			P
7439-89-6	Iron	27100			P
7439-92-1	Lead	827			P
7439-95-4	Magnesium	4800	B		P
7439-96-5	Manganese	6130			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	16.3	B		P
7440-09-7	Potassium	1510	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	3.5	B		P
7440-23-5	Sodium	1030	B		P
7440-28-0	Thallium	9.9	B		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	13900			P
	Cyanide				NR

SL 10/6/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK70

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23261S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12.0	U	J	P
7440-36-0	Antimony	3.0	U	NJ	P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	0.70	U		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	116	B		P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	8.0	B		P
7439-89-6	Iron	27.1	B		P
7439-92-1	Lead	1.7	U		P
7439-95-4	Magnesium	14.4	U		P
7439-96-5	Manganese	5.9	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	86.7	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	25.6			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK71

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23262S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	258	—		P
7440-36-0	Antimony	3.0	U	NJ	P
7440-38-2	Arsenic	31.2			P
7440-39-3	Barium	17.7	B		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	33.2			P
7440-70-2	Calcium	8000			P
7440-47-3	Chromium	1.3	B	U	P
7440-48-4	Cobalt	16.0	B		P
7440-50-8	Copper	34.4			P
7439-89-6	Iron	24700			P
7439-92-1	Lead	732			P
7439-95-4	Magnesium	4870	B		P
7439-96-5	Manganese	6190			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	16.6	B		P
7440-09-7	Potassium	1550	B		P
7782-49-2	Selenium	3.9	B		P
7440-22-4	Silver	2.3	B		P
7440-23-5	Sodium	963	B		P
7440-28-0	Thallium	7.5	B		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	14000			P
	Cyanide				NR

✓ 10/6/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK72

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23263S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12400			P
7440-36-0	Antimony	8.8	B	N UJ	P
7440-38-2	Arsenic	662			P
7440-39-3	Barium	7.8	B		P
7440-41-7	Beryllium	6.8			P
7440-43-9	Cadmium	1100			P
7440-70-2	Calcium	36100			P
7440-47-3	Chromium	7.5	B	UJ	P
7440-48-4	Cobalt	152			P
7440-50-8	Copper	373			P
7439-89-6	Iron	769000			P
7439-92-1	Lead	863			P
7439-95-4	Magnesium	87200			P
7439-96-5	Manganese	104000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	156			P
7440-09-7	Potassium	797	B		P
7782-49-2	Selenium	70.9			P
7440-22-4	Silver	34.4			P
7440-23-5	Sodium	27800			P
7440-28-0	Thallium	175			P
7440-62-2	Vanadium	1.4	U	J	P
7440-66-6	Zinc	525000			P
	Cyanide				NR

See p/26/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

9

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK73

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23264S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	495			P
7440-36-0	Antimony	3.0	U	NJ	P
7440-38-2	Arsenic	11.4			P
7440-39-3	Barium	23.9	B		P
7440-41-7	Beryllium	0.41	B		P
7440-43-9	Cadmium	25.8			P
7440-70-2	Calcium	7730			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	4.6	B		P
7440-50-8	Copper	22.4	B		P
7439-89-6	Iron	5970			P
7439-92-1	Lead	185			P
7439-95-4	Magnesium	7280			P
7439-96-5	Manganese	4860			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	6.1	B		P
7440-09-7	Potassium	782	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	837	B		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	9460			P
	Cyanide				NR

SR 10/06/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

10

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK74

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23265S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	25700			P
7440-36-0	Antimony	22.9	B	NUJ	P
7440-38-2	Arsenic	1440			P
7440-39-3	Barium	9.1	B		P
7440-41-7	Beryllium	13.3			P
7440-43-9	Cadmium	2150			P
7440-70-2	Calcium	56500			P
7440-47-3	Chromium	13.0		UJ	P
7440-48-4	Cobalt	299			P
7440-50-8	Copper	789			P
7439-89-6	Iron	1750000			P
7439-92-1	Lead	967			P
7439-95-4	Magnesium	117000			P
7439-96-5	Manganese	205000			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	298			P
7440-09-7	Potassium	639	B		P
7782-49-2	Selenium	141			P
7440-22-4	Silver	58.0			P
7440-23-5	Sodium	74500			P
7440-28-0	Thallium	370			P
7440-62-2	Vanadium	1.4	U	J	P
7440-66-6	Zinc	1210000			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJAK75

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23266S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	195	B		P
7440-36-0	Antimony	3.0	U	NJ	P
7440-38-2	Arsenic	14.3			P
7440-39-3	Barium	18.0	B		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	25.1			P
7440-70-2	Calcium	8220			P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	15.5	B		P
7440-50-8	Copper	20.7	B		P
7439-89-6	Iron	20700			P
7439-92-1	Lead	759			P
7439-95-4	Magnesium	4990	B		P
7439-96-5	Manganese	6340			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	16.5	B		P
7440-09-7	Potassium	1520	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	B		P
7440-23-5	Sodium	926	B		P
7440-28-0	Thallium	5.8	B		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	13000			P
	Cyanide				NR

10/26/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJAK76

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27252

SAS No.:

SDG No.: MJAK65

Matrix (soil/water): WATER

Lab Sample ID: 23267S

Level (low/med): LOW

Date Received: 07/28/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	24.0	B	J	P
7440-36-0	Antimony	3.0	U	NJ	P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	0.70	U		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	75.2	B		P
7440-47-3	Chromium	1.6	B	U	P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	115			P
7439-92-1	Lead	1.7	U		P
7439-95-4	Magnesium	14.4	U		P
7439-96-5	Manganese	11.9	B		P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	106	B		P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	35.0			P
	Cyanide				NR

10/10/99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

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